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2. [redacted] noise modulation was discussed only for [redacted] magnetrons (9-12cm) and practical attempts were made to keep the band width as narrow as possible in order to attain maximum power output. However, since the noise modulation itself resulted in a band width of 5-6 mcs , it was impossible to further narrow the band width by attempting to improve the natural characteristics of the magnetron.

Independent of this work, a second project existed, namely, the development of a new type of magnetron which was to have as broad a frequency band as possible, from 50 to 100 mcs. This problem reached only the discussion stage at Institute 160, [redacted] from conversations with 25X1 ZUZMANOVSKIY that probably Institute 108 in Moscow was also concerned with the task and that some experimentation was being conducted there. [redacted] discussions on considerably 25X1 broadening the band width of a magnetron by heating a simple spiral cathode with noise current and effecting phase modulation similar to the now well-known American phasetron. If this method proves practical, it is probably possible to effect a very broad frequency band and the width will then depend primarily on the "Q" of the anode circuit. If a practical "Q" value is computed, a band width of about 50 mcs would be possible. [redacted] 25X1 [redacted] the width of the band depends on two factors, at Fryazino: first, the method of frequency modulation, and, second, that the "Q" of the anode circuit must not be much lower than 100 or else the magnetron ceases to oscillate. With a "Q" of 100, a 50 mcs. width is possible when the spiral cathode is heated by a noise current to accomplish phase modulation of the electron stream through the varying magnetic field of the spiral.

But these experiments were not actively undertaken at Fryazino, [redacted] 25X1 [redacted] experimentation was actually taking place at some other institute, most probably Institute 108, Moscow. In connection with noise modulation, only the 9-12 cm

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narrow band magnetron was in quantity production at Fryazino. Other magnetrons were in the development stage, however, as have been discussed previously.

3. [redacted]

4. 25X1

5.

Regarding this special 3 cm magnetron with a thorium oxide cathode, [redacted] the power was supposed to be 500 kw peak, and that much work was put into its development. Work was virtually stopped, however, when the thorium oxide supply from the firm Heiden in Dresden was exhausted. The thorium oxide from Dresden was adequate, but [redacted] the Soviets did not succeed in producing a material of comparable quality. The project, therefore, was delayed because of the lack of a suitable cathode material, but interest was still high in completing the development of this magnetron. 25X1 25X1 25X1

6. [redacted]

In connection with this problem of generating 50 cm to 1.5 meter wave lengths, [redacted] the development 25X1

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[redacted] 25X1

of cavity circuits and measuring devices was being carried on. [redacted] designers had completed the drafting 25X1 work on a special, relatively low-frequency magnetron, but it was primarily nothing more than scaling up from 10 cm. [redacted] 25X1 other principles were better suited to low-frequency magnetrons, [redacted] considering the idea of integrating a number of two-slot magnetrons in one envelope, i.e., to use the cavity construction which is common practice in many conventional types, but to include an individual cathode for each two-slot section. [redacted] hoped to attain a much higher degree of efficiency by using this type of construction. 25X1

7. [redacted]

In detecting the V-2, the range depends only on how high the missile flies. Radar technique is not a problem since any range allowable by missile height can be attained by high power and large antenna reflectors. [redacted] two such objects (one the counter-missile) could be detected at 300 - 400 kms. with certainty. But SHOKIN was of the opinion that this detection range would not be of help since it would not allow enough time to compute the exact trajectory and launch a counter-missile. His opinion during 1945-46 was that it is impossible to counter the V-2 with guided missiles.

8. [redacted]

The development of the 8 mm magnetron was predicated on an article published in 1945 in some American magazine [redacted] on the development of a 1.25 cm radar. The article included a scope photograph showing the city of New York in great detail. For this reason, there was a great deal of interest in the 1.25 cm magnetron, and the Soviets asked [redacted] if [redacted] possible 25X1 to work with even shorter wave lengths. After examining the possibilities, [redacted] believed it possible to construct magnetrons and klystrons down to a wave length of 8 mm. Late in 1946, great importance was attached to this project [redacted] promised a premium if the development was expeditiously completed. 25X1 However, no satisfactory solution was ever found at Institute 160.

In 1950 or 1951, [redacted] an 8 mm klystron which was 25X1 produced in an institute in Moscow. It was a reflex type and was used [redacted] to develop silicon detectors for 8 mm. 25X1 This tube used about 2000 volts on the anode and produced, [redacted] about 1 milliwatt of power. However, the 25X1 USSR is now aware that klystrons down to 4.2 mm have been produced in the U.S. In 1949, [redacted] General Electric 25X1 announced the fact that they had constructed a 4.2 mm

[redacted] 25X1

klystron and the technical details, including illustrations, were published in a magazine. The technique of the Soviet klystron was very similar to that announced by General Electric.

9. [redacted] 25X1

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11.

12. [redacted] The required frequency stability of the 10 cm. magnetron was 10^{-5}. The power output was approximately that of the SCR-584 magnetron because we were told to carry out the investigations on a tube which could be used in the SCR-584. In connection with this problem, [redacted] an SCR-584 25X1 modulator and transmitter to assist in carrying out the work on frequency stability.

During general discussions on magnetron stability problems, there seemed to be 3 separate parties represented and interested in this matter. One of these groups was especially interested in stability from the standpoint of beacon operation. This problem is probably best solved by coupling cavities, as RCA did with the 3.8 cm beacon. There was a report on this technique in one issue of the RCA Review.

The particular reasons for interest shown by the other two groups were never stated. [redacted] from 25X1 the fact that a power output corresponding to the SCR-584 (over 50 kw peak pulse power) was wanted, that at least one of these groups wanted to use the magnetrons for missile guidance purposes. [redacted] 25X1 work on this problem was needed. [redacted]

[redacted] could not discuss magnetron stability problems affecting practical applications in equipment with [redacted] Soviet 25X1 bosses because they did not understand this phase of the work. [redacted] 25X1 they did not understand practical applications.

[redacted] 25X1

[redacted] the following as regards the stability and altitude requirements for magnetrons. There probably are no magnetrons in the missiles themselves. At least, according to BUSCHBECK, metal ceramic tubes were used. The altitude requirements were stated to be 120 km , the peak height reached by the V-2. Power output is not critical and only a few watts would be sufficient, for it is really a means of communication. 25X1

13. [redacted] 25X1

The development of tubes for the generator was completed at the end of 1949. Very high prizes were distributed among the Soviet engineers for completion of this development, a sign that the problem was considered to be very important. [redacted] it was stated in the problem [redacted] that the equipment was to be suitable [redacted] should be of very light weight. [redacted] the tubes which were developed did not fulfill this requirement, since they were approximately 50 cm high. The problem could have been solved with a tube only 15 cm high.

The tube development was done for an institute in Leningrad, [redacted] Men from Leningrad were often present to discuss the problem and later came to conduct the acceptance tests.

14. [redacted] 25X1

A high precision tube was developed in the Cathode Ray Tube Department, but it was not a cathode ray tube in the conventional sense. It did not have a screen, but was a special tube developed for a computer. It did, however, have a deflection system similar to a cathode ray tube. In place of the screen there were several control electrodes which served to deflect the electron beam in the manner of an electronic switch. It was definitely constructed for some type of computer.

[redacted] 25X1

[redacted] 25X1

15. [redacted] 25X1 This was an external cavity klystron with a glass envelope and two copper disc electrodes which projected through the envelope to form connections to the cavity. A large number of screws on the outside of the cavity were used to inductively change the frequency in the same manner as it was done in the German "Rotterdam" device. These screws allowed a frequency change of approximately ± 10 percent. The Soviets made two models of this klystron-- one, an exact copy of the English one with a relatively large glass envelope (10 - 12 cm long); and later they developed the second model, by changing the base structure and shortening the over-all length. Originally the tube had a flat pressed pinch base and this was changed to a disc base as is used in modern miniature tube construction. The shorter model, which was more stable, was adopted for serial production.

[redacted] this klystron [redacted] was for either a radar or passive detection receiver for monitoring purposes.

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16. [redacted]

17. [redacted] The "Meddo" device was referred to by that name also by the Soviets, since they learned about it [redacted] 25X1 the number produced, [redacted] 50 - 100 suitable magnetrons per month were made in Fryazino. [redacted] the magnetrons were made in Fryazino and the klystrons at Svetlana. [redacted] 100 per month. [redacted] 25X1 the four-engine airplane [redacted] had a plexiglass dome underneath in which there was room for a normal antenna of the type required. It appeared as though the German antenna was used rather than the American one. [redacted] the American antenna was 25X1 very tall and was let down about 1 - 1.5 meters beneath the airplane. The German antenna was only about 40 - 50 cm. high. The dome underneath the airplane appeared as if there were room for the German antenna.

18. [redacted] 25X1 They often flew over, and probably belonged to the Tushino airfield. There was a large group of planes at Tushino [redacted] the first units of these large four-

[redacted] 25X1

engined planes were stationed there. At least that is what the Soviets said. It was also said that Vasiliy STALIN commanded these units. [redacted] Vasiliy STALIN was in Tushino from the fact that he sometimes met with General BELYAKOV. Also, he was deputy of the RSFSR (Russian Soviet Federal Socialist Republic) for the Shchelkovo area. Since Tushino lies in the Shchelkovo district, he must have lived in the area in order to be its deputy. [redacted] he was commander of Tushino. 25X1

19. [redacted] 25X1

20.

21. [redacted] they (BUSCHBECK's group) were building another device with metal-ceramic tubes. [redacted] they wanted to use a somewhat longer wave length, about 17 cm, for actual guidance of the missile. This is identical with the wartime German project. [redacted] the project for missile guidance was to follow the same technique [redacted] used during the war and which was developed especially for the V-2 at a wave length of 17 cm. But, if this SCR-584 device had a purpose in connection with this system, then it could be used only to monitor and not to guide.

22. [redacted] they made V-2 experiments. [redacted] nothing about any other experiments in the USSR other than on the V-2. A great number of V-2 test flights were 25X1

[redacted] 25X1

26. [redacted] 25X1

27.

28.

The German "Pauke" was taken by the Soviets who later worked in Institute 108, Moscow. It certainly went into Institute 108 and was complete and capable of operation.

29. [redacted] they would be interested in having a simpler device. "Pauke" was rather complicated. [redacted] But a similar device is absolutely necessary in an air battle with a jet-powered airplane. It cannot be done without one. Without such a device, one cannot shoot and the Soviets also know this. [redacted] whether they use the same device or whether they have a simpler one.

30. [redacted] REHBOCK did not develop essentially direction-finding equipment, but rather monitoring devices. This group worked on the whole frequency range from 3 centimeters to 90 meters. Three- to 10-centimeter receivers were built, not on the superheterodyne principle, but with simple detectors. The antennas were simple parabolic reflectors. The 10 to 40 cm receivers also used parabolic reflectors but were superheterodynes. Above 40 cm , superheterodyne receivers and dipole antennas were used. From 7 to 15 meters, a system similar to the German "Wollenweber", i.e., with a "Musa" antenna (multi-unit steerable array), was developed with an angular accuracy of about 2 degrees. A "Wollenweber" system was developed for the range of 15 to 90 meters and installed in the vicinity of Moscow. All this work was done in an institute near Moscow which belongs to the MGB [redacted] This institute 25X1
in which REHBOCK, SCHUETTLOEFFEL and a third German worked is an MVD institute. [redacted] Comment: The third 25X1
member of the group was PREISSNER.7

[redacted] 25X1

made, but all those which took place before 1949 were made with German gyroscope equipment [redacted] 25X1 The Soviets found a large supply of these devices, perhaps in Thuringia, and made the test flights, at least up until that time (1949), with these. [redacted] Since high-frequency control problems had not been solved, all test flights were made by gyro control.

23. [redacted] There were two projects at Institute 160 for which the SCR-584 was supposed to be used. [redacted] the frequency stability problem of the impulse magnetron with a required frequency constant of 10^{-5}. A second project was concerned with a continuously tunable impulse magnetron developed at Institute 160. Also in connection with this second task was a special problem in the field of klystron development. The whole idea was to develop a simple means of radar antijamming. By this means of antijamming, the Soviets wanted to be able to switch - tune the magnetron and klystron to four different frequencies, so that when one channel was disturbed they could quickly change to another. [redacted] 25X1 this particular tunable magnetron, which was also tested in the SCR-584, was intended for this purpose.

24. [redacted]

25. [redacted] the antenna was the same as that pictured in the September or October 1947 issue of Electronics magazine. Next to the antenna were two large shelters which were approximately the same size as the SCR-584 shelters. Two shelters are used with the SCR-584 - one for the generator power supply, and the second for the crew with the PPI's and other devices. The only difference was that there was a layer of dirt about 40-50 cm thick on top of the shelters. They looked exactly as shown in the American magazine except for the layer of dirt on the roofs. [redacted] 25X1 it is a small device and could have been inside one of the shelters.

[redacted] 25X1

31. [redacted] The Soviets [redacted] wanted a very detailed study made on how short-range navigation systems could be set up to serve several airplanes at once. Such a system was outlined [redacted] in Berlin and worked out by KESSEL. [redacted]

25X1

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32.

33.

34. During 1949-1952 mostly miniature types were developed - a rather complete series for battery operation as well as indirectly heated cathodes. They were greatly interested in developing tubes for broad band applications. Extensive investigations were made for this purpose on tubes with secondary emission characteristics, i.e., with oxide cathodes, grids, and one-stage secondary emission

 [redacted] 25X1

characteristics. A tube was developed similar to that which is described in Terman's handbook as a simplified secondary emission amplifier for broad bands, 10 mcs. and more.

35. [redacted] 25X1

[redacted] The 829 is a transmitter tube with two sets of elements. This tube was copied at Svetlana, not in Fryazino. The 829 was already in series production at Oberspreewerk, Berlin, in 1946 and production continued at Svetlana. General production of medium power tubes was not carried out in Fryazino. Except for receiver tubes, magnetrons, and klystrons, only modulator tubes were manufactured at Institute 160. However, a few types of medium power tubes, essentially the 6L6, the 807, and 1625, were produced. A third type of practically the same construction was also turned out, but the 829 was made at Svetlana. 25X1

36. [redacted] these types were not made in Fryazino.

37. [redacted]

38.

39. Under the direction of the Ministry of Internal Affairs, a large part of the atomic research was done. The group of Manfred VON ARDENNE belonged to the 8th or 9th Chief Directorate of this ministry.

40. [redacted] 25X1

[redacted] 25X1

[redacted] the project worked on at Gorkiy was an airport surveillance radar, not essentially a blind-landing device.

41. [redacted] blind-landing systems [redacted] were special concerns of Prof STILLERMANN, who belonged to the staff of Lt. General BELYAKOV. STILLERMANN was at the [redacted] blind-landing conference in 1946 [redacted] he considers the best system to be one which allows completely automatic landings to be made, i.e., so that the system can be switched to automatic control and the plane landed without any help from the pilot. This ultimate condition was discussed in [redacted] 1946, but had not then been achieved anywhere. 25X1 25X1

42. [redacted] blind-landing equipment [redacted] only an idea and made a sketch of the principle. The indicator worked on the principle of two moving spots on a cathode ray tube screen. When the distance from the runway was great, the two spots were very close together, but moved horizontally further apart as the approach distance was decreased. From the distance between these two points, which were maintained equidistant from the center of the indicator for correct bearing in azimuth, one could quickly see the relative distance to the runway. From the vertical position of these two points one could recognize immediately whether the angle of descent to the landing strip was correct. If the aircraft was above the glide path the points were above center, and, if below, the points so indicated. [redacted] such a system on paper, but did not go into detail. Prof. STILLERMANN said that he thought this idea was extraordinarily interesting, but that it did not meet the requirements set forth [redacted] for a fully automatic system. The idea [redacted] presented was for manual operation of the aircraft. One very good feature was the easily determined distance from the runway during the last part of the approach, since the space between the two indication points increased more rapidly as the distance to the runway decreased. [redacted] 25X1 25X1 25X1 25X1

43. [redacted] 25X1

44. [redacted]

[redacted] 25X1

[redacted] 25X1

The prohibition was enforced because 5-7 German specialists and their wives visited Zagorsk and made themselves too obvious. That they visited Zagorsk, even though they knew that they were not allowed to go, was not too bad, but they asked permission to take photographs. That caused a very special, very difficult situation. At this the people in Zagorsk noticed that they were Germans and telephoned Fryazino to report that German specialists were there. They demanded that a Soviet escort be sent to Zagorsk to fetch the Germans. Meanwhile, the Germans left and the Soviets made the trip in vain. This made the Soviets very angry and they prohibited any visits to Zagorsk. One man, not a member of the group [redacted] 25X1 was once in Zagorsk and an old Soviet said to him, "Many other Germans are working in the vicinity of Zagorsk, but under quite different circumstances than you - bad conditions". He thought this statement inferred that there was a prisoner-of-war camp in the vicinity, [redacted] the aforementioned prohibition was caused by the German specialists who angered the administration in Fryazino. 25X1

45. [redacted] The system for short-range navigation [redacted] worked out at OSW was essentially as follows. Each airplane has a transmitter and receiver and two stations are located on the ground at a definite, very well-known distance from each other. These ground stations pick up, amplify, and send out the signals which they receive from the airborne transmitters. One could almost call them repeater stations. The return time measurements are made in the airplanes. One special consideration is that the system must serve many airplanes simultaneously. In order to avoid disturbance and false readings as each airplane triggers the ground stations, the ground antennas are made rather sharp in directivity and rotated. As they rotate, they receive signals and make the reply for only a narrow space segment. In this way airplanes which differ only slightly in bearing from the ground stations can interrogate and receive replies without mutual interference. These are the essential features of this system [redacted] - measurements made in the airplane, only two ground stations, and rotating, directional antennas to avoid simultaneous disturbance. 25X1

46. [redacted]

47. [redacted] 25X1

[redacted] 25X1

"boomerang" system was used [redacted] against definite targets in Germany, especially in the Ruhr, the Soviets also discussed the possibility of exact orientation of airplanes near the front. That was a second intention for the use of this system, i.e., not only for use against industrial targets, but also to make exact orientation near the front possible. 25X1

48. [redacted] 25X1

[redacted] tube put out by Oberspreewerk was chiefly to be used as the PPI for "Meddo" radar. This tube, worked on at 632, Moscow, had a two-layer phosphorescent screen just like those [redacted] produced at Oberspreewerk. 25X1 25X1

49. [redacted]

50.

51. 25X1

[redacted] The work on the new institute building in Fryazino was done between December 1946 and January or February 1947. On the institute grounds in Fryazino, almost in the middle, construction of this new building was begun. A cellar, an air raid shelter, was already there and also a large part of the foundation upon which the institute was to be built. The construction plan, i.e., the architectural plan, was 100 per cent complete. [redacted] This work was 25X1 25X1

[redacted] 25X1

done in early 1947 and suddenly became very urgent. Therefore, all the people who were concerned with it, approximately 12 - 15, were gathered in the library and allowed to work only there so that the task would be finished as quickly as possible and so that the German specialists would not be disturbed by this work. [redacted] 25X1 The equipment problems of the individual laboratories and workshops were worked out by the laboratory directors and foremen of the workshops. The project is not yet complete, but [redacted] 25X1 it was again mentioned that the institute is to be built. They have not yet given up the plan. It is possible that during this year or next the institute may actually be built as was planned in 1947 [redacted] 25X1 the Soviets themselves said that it would be built some day, even if it took a long time in doing. It would happen and it would be built there. They said that it sometimes takes that long with them. It is probably true that this institute will be built as planned.

52. [redacted] 25X1 RIEDEL was taken away by the GPU, MGB, or MVD in 1949. [redacted] the reason for his arrest was that while RIEDEL was in the USSR he corresponded a great deal with his former colleagues and had written many technical details and made suggestions about the reconstruction of industry, especially the plants in the Sudentenland [redacted] there was a large group from his former plant who had built a new plant. [redacted] 25X1 he caused his misfortune with the GPU mainly by this [redacted] correspondence. [redacted] they talked against RIEDEL a great deal, said that he was a capitalist, and that he would have difficulties very soon. The people said that, about a month before he was taken, a GPU agent spoke quite openly to the Germans about it, saying that he was a capitalist and would soon come to an end. [redacted] 25X1 the main reason was because of his former plant, which branded him as a capitalist.

53. [redacted]

 [redacted] 25X1

[redacted] The quality of glass blowing at Institute 160 was generally quite adequate. There were no outstanding glass blowers there, but the work which had to be done was done. It should be noted that there was a lot of work done in hard glass, especially in Nonex glass, which is relatively easy to work with. The over-all quality of the glass, not only of the work done by the blowers but also that done in the glass works in the plant, was not very high but [redacted] adequate for the special demands of the institute. 25X1 25X1

54. [redacted] 25X1

[redacted] job was assigned by Lt. General [redacted] in May 1946 in Berlin. [redacted] the project was very important and that a prize of over 1,000,000 Ost Marks was offered for a quick solution. The problem was to develop a long-range navigation system similar to Loran, but it was to have a greater range - up to 3000 km was desired - and the accuracy was to be within 5 km. 25X1 25X1

[redacted] It was noted that the Loran frequency was well selected for minimum atmospheric disturbance, but on the other hand, not the optimum for accuracy at long distances. [redacted] decided to use a longer wave length. [redacted] considered 1000 meters, but later decided on 2000 to 3000 meters (100 - 150 kcs). 25X1

The work was very intensively begun in Germany. [redacted] a great many power devices from other factories, e.g., high voltage supplies from Dresden, and [redacted] worked out a scaled-down antenna system for short waves, but no other individual part of the entire system was ever completed. The entire project consisted of experiments with individual parts of the whole system - more of an experiment with models. The over-all idea was a hyperbolic system, impulse modulated for a high peak power output to avoid as much interference as possible. 25X1

[redacted] The chief workers on the project were KAUFMANN and KOTOWSKI. AMMON did not work on it; that is a mistake. HASSELBECK made antenna investigations, but KOTOWSKI and KAUFMANN were concerned with the entire project. 25X1

 [redacted] 25X1

[redacted] 25X1 KAUFMANN did most of his actual work on the receiver, KOTOWSKI the system as a whole, and HASSELBECK on the antenna. One more point on this matter. The decision to change to very long waves was strengthened by the fact that Prof. ZINKE [redacted], made a 25X1 very important theoretical investigation in 1946 on long-range propagation and established that the range of very low frequencies is much better than shown by the Austin formula. This formula is very old; it originated in about 1900. As a result of ZINKE's experiments, many essential corrections of the Austin formula were made. That was the real reason for reducing the frequency of this navigation system to the 100 kcs. region. [redacted] 25X1

55. [redacted]

56. [redacted]

57. [redacted] For finishing the individual units and then to construct the three stations in the USSR 6 months later. PEDERZANI, who started to work at OSW in October 1946, the same month he was sent to the USSR, was supposed to set up the entire system in the USSR later. It was planned to locate the three stations at great distances from each other - one in the north, one down on the Black Sea, and the third either in the Caucasus or even in Poland or Germany. The complete system was to form a very large triangle.

58. [redacted] 25X1

59. [redacted] The vibration generators were German machines of the usual type. [redacted] there were two [redacted] were well known types. There were several of these in the institute, but the Soviets had no special developments of their own. [redacted] heard nothing 25X1 of receiver tube acceleration tests being made in Fryazino. There were vibration tests but not acceleration tests.

 [redacted] 25X1

60. [redacted] 25X1

There were no special cases in which acceleration was important. Sixty g is considered for tubes mounted directly on airplane engines. The V-2 is capable of 60 - 100 g and 2000 g must be considered for projectiles. But all these experiments were not made. In this field (acceleration) tubes are not critical up to 60 g. On the other hand, vibration characteristics are critical because of resonance considerations. Simple acceleration is not a critical problem, [redacted] no work was being done on tubes for proximity fuses. [redacted] 25X1 there was one indication of tubes for proximity fuses. This was the inquiry to the Machine Construction Department if they had, or could make, machinery for constructing sub-miniature tubes. [redacted] 25X1 [redacted] SEEBODE, the director of the Spotcheck Testing Laboratory, went to Kalinin several times during our stay and said that a new tube factory was being built there. Also, the request for sub-miniature tube construction machinery was for a factory in Kalinin. It probably can be assumed, then, that in 1949 they began to produce such tubes in Kalinin.

[redacted] Major CHELETNIN made this development. He is the only man in the Soviet Union [redacted] capable of making tubes for proximity fuses. These were not developed [redacted] in Fryazino, so the question of who, in the Soviet Union, would be capable of making such tubes arises. [redacted] Major CHELETNIN is the only one. There is a strong possibility that he did this. [redacted] CHELETNIN wanted to flee from Berlin to the West in 1947 or 1948. When he went to the East sector for the last time to get his last trunk, he was arrested and taken to the USSR. The Soviets knew that he wanted to come to the West and [redacted] anticipated his arrest the moment he wanted to go. Even the Soviets talked about it. He was not punished, however. At first he was sent to Novosibirsk for a short time and then to Leningrad. Generally, they only send those to Leningrad whom they greatly trust, or who have a very important job to do. It is quite possible that they took CHELETNIN to Leningrad because it is not far from Kalinin and that he developed the proximity fuse and started production. This combination is very logical. Otherwise, it cannot be explained politically why CHELETNIN was not punished. If he was not punished for attempting to escape, he must have done an extremely important job. He was technically capable of such a job, [redacted] 25X1 experience in Korea must have shown whether the Soviets have proximity fuses or not. If indications are positive, [redacted] CHELETNIN developed them. [redacted]

[redacted] 25X1

61. [redacted] 25X1

62. [redacted] 25X1

[redacted] 25X1 In general, the Germans were used to advise the Soviets in technology, but were not used for work on new problems. The only jobs which had the character of new problems were the development of special tubes and experimental methods for the 40 kcs generator (previously mentioned) and the work on magnetron frequency stabilization. Otherwise, special problems were not given to the German specialists.

63. [redacted] 25X1

[redacted] 25X1 Dr. BUSCHBECK was formerly the director of transmitter development at Telefunken. He is one of the best specialists in the world in the field of short waves and short-wave transmitters. He is especially well known for the BUSCHBECK meter, a special instrument which indicates correct matching of transmission lines to antennas and which also shows maximum voltage points on a coaxial cable. But his main importance lies in his studies of neutralization methods for large transmitters. This was his chief contribution, which he started about the middle of the war. After the war he developed the "Marius" transmitter. This was his last piece of work in his old field. After the "Marius" was finished, he worked on special war problems such as the V-2.

EITZENBERGER, on the other hand, cannot be considered a specialist. He is more of a small manager in this field. Not a physicist or engineer, but more a manager.

64. [redacted] 25X1

"Hawaii I" was a 6-meter wave length transmitter corresponding to the one used in the old German blind-landing

 [redacted] 25X1

system. We had a blind-landing system in Germany for a long time which worked on a wave length of 6 - 7 meters. A guiding system was developed for the V-2 on the same principle quite early in the war. [redacted] Lorenz was the company. But this system was not used because they were afraid it could be jammed too easily. That is why gyro control was installed in the V-2's fired during the war. "Hawaii II" was the code name for the 17-cm guiding system [redacted] started at Telefunken. That is the connection. This was his old work and [redacted] he worked chiefly on "Hawaii II" in the USSR. These designations are all old German code names. 25X1 25X1 25X1

65. [redacted] 25X1

Drs. STEENBECK and HERTZ live at present on the coast of the Black Sea at the foot of the Caucasus. Both of them belong to the Manfred VON ARDENNE group, the atomic research group at Sukhumi, and are department or laboratory chiefs. They are really the best technical men in the group. Dr. STEENBECK is known principally as the designer of the betatron at Siemens and built a 30-megavolt betatron during the war. Prof. HERTZ was formerly the director of the Second Physics Institute at Siemens. 25X1

66. [redacted] 25X1

"Wollenweber" is more of an antenna for monitoring (intercept) and not especially for navigation. It was reconstructed in the Soviet Union by the SCHUETTLOEFFEL-REHBOCK group, [redacted]

67.

68. [redacted] work on the antijamming feature of utilizing one of several quickly changeable frequencies. [redacted] Now and then they worked on the question of varying wave lengths with great interest. On the other hand, the problem of finding a solution of antijamming by new methods was not investigated to my knowledge. Questions such as frequency modulation for radar, which is probably very important for antijamming methods, were not discussed.

[redacted] 25X1

25X1

69. [redacted] In January, February, and March, there was a great deal of activity in Germany about this radar device. [redacted] there was a large metal tower at our plant in Zehlendorf which was quickly dismantled so that it could no longer be used as a radar target, and that all possible similar work was done elsewhere. 25X1

70. [redacted] work by KOTOWSKI on the coding of telephony, this procedure [redacted] name "Anna". It could be that this was the code name within Telefunken and that the official name was "Kurier". [redacted] This work was especially secret. The procedure was to add disordered frequencies to the normal speech frequencies, and then deduct again at the receiving station. This was the "Anna" system. It was the best telephony coding method known and the most secure. But it was technically very difficult and expensive and the transmitted interference had to be 8 - 10 times stronger than the desired signal in order to be completely safe. Also, it was difficult to compensate exactly at the receiving station. [redacted] it was really good and reliable. [redacted]

25X1 25X1 25X1 25X1

[redacted] 25X1

It is important to mention one more thing in this connection. First, [redacted] the transmission which 25X1
[redacted] called "Klax" (a communication is pictured or written 25X1
down, and with a procedure like television is picked up and repeated very quickly by a broad band transmitter) is probably what you call "flash". REHBOCK said that they could establish "Klax", i.e., the direction from which it was coming with the Musa antenna which they built, when the duration was longer than 10 milliseconds. This is extraordinarily sensitive, even for quick communication. They tested this problem as to whether the location of the transmitter could be established, because this is especially important for naval operations. There are two problems. One is to find where the signal is coming from, and the second is to get the transmitted intelligence itself. The first problem has apparently been solved by the "Wollenweber" antenna. That is very important.

71. [redacted] 25X1

72.

73.

74.

[redacted] It is possible that the institute in the eastern suburb of Moscow and Institute 885, Novaya, are the same. [redacted] 25X1 25X1
[redacted] Silberwald is a residential area where BUSCHBECK 25X1
now lives. [redacted] 25X1

75. [redacted] 25X1

[redacted] 25X1

25X1

76. [redacted] Work [redacted] was conducted by BAER, [redacted] This special work was to develop a sweep method with extreme linearity; a lineal error of only 1 per mil was allowed. The pair of impulses spoken of here was the research method BAER worked out to control the linearity of the saw-tooth shaped voltage. All this work by BAER was done to produce linear saw-tooth wave forms and to measure the linearity. It was all done in connection with the computer.

77. [redacted] 25X1

78. [redacted] the Soviets were very interested in the "Goliath" system which was developed in Saxony in the city of Kalbe. SHCHUKIN, a professor in Leningrad and co-editor of the scientific magazine Radio, was in Germany after the war and was especially interested in the "Goliath". The antenna system was outstanding and had a ground resistance of only 0.3 ohm. It was rather famous for this reason. The antenna was especially suitable for very long waves, had a high degree of efficiency, and was built for communication with U-boats. There were two large systems in Germany intended for communication with U-boats, the "Goliath" for very long waves, by Lorenz, and the "Marius" for short waves, developed by BUSCHBECK. SHCHUKIN was interested in the one for very long waves. He was very well-informed on all questions of U-boat communications and knew, for example, at what depth U-boats can be communicated with perfectly on very long waves, when the top of the antenna is about 4 meters below the surface. Such matters were very familiar to him. He was especially interested in the high efficiency of the "Goliath" antenna in Kalbe. [redacted] 25X1

[redacted] 25X1

79. [redacted] 25X1

80. [redacted] frequency stabilization problems [redacted] were three reasons for the frequency stabilization investigations, [redacted] There was a great deal of interest in individual cases of periodic frequency instability for a period of 1 to 2 seconds - a change in frequency because of a change in the radiation characteristics of the antenna. You can imagine that as a radar antenna rotates on a ship, for example, that there will be frequency changes as the antenna swings past a mast, or other structures in line with the radiation path. This was one of the most important considerations in the problems of frequency stability. It was demanded that the frequency remain constant to 10^{-5} when the antenna swung past an object in close proximity. [redacted] It seemed quite specifically as if the point was to stabilize the frequency when the antenna moved in line with a reflecting object, since the change was stated to be periodic.

81. [redacted] 25X1 It was suggested that a magnetron which can be mechanically tuned, be tuned by a low inertia motor which is controlled by a frequency discriminator. When a small frequency deviation is detected by the discriminator, the motor starts immediate mechanical tuning to compensate for the frequency shift. This connection can be done so quickly that periodic frequency variations as the antenna rotates can be virtually eliminated. [redacted] One must have a very good laboratory to solve servo problems.

[redacted] 25X1

25X1

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